

Catalogues of Western Electric Company.—No. VII. Private Line  
Instruments

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MANUAL OF

TELEGRAPHY,

AND

CATALOGUE

OF

Private Line Instruments.



WESTERN ELECTRIC COMPANY,

CHICAGO and NEW YORK.

# CATALOGUES

OF

# WESTERN ELECTRIC COMPANY.

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ON RECEIPT OF PRICE IN STAMPS OR CURRENCY.

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I.—Complete Set of Catalogues . . . . .	220	20c.
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Instruments.

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URBANA

MANUAL

OF

TELEGRAPHY,

AND

CATALOGUE OF INSTRUMENTS

ADAPTED FOR USE

ON PRIVATE LINES.

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Western Electric Company,  
CHICAGO AND NEW YORK.

1883.

# WESTERN ELECTRIC COMPANY.

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CHICAGO: 220-232 Kinzie Street.

NEW YORK: 62-68 New Church Street.

537.81

B61m

Engel

## TERMS.

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*From May 20*  
The prices given for Instruments and for Battery and Battery Supplies are subject to the following **Discounts for Cash with Order:** Main Line Instruments,  $33\frac{1}{2}$  per cent.; Private Line Instruments, 20 per cent.; Battery and Battery Supplies, 10 per cent.; Line Material, 5 per cent.

Orders must be accompanied by a remittance, otherwise they will be declined.

*Ben Pas Paine 20 Jan 41 Worcester*  
Money may be sent by Express, Registered Letter, Money Order, or Draft. Postage Stamps may be sent for odd amounts, where most convenient.

No goods will be sent C. O. D. without a deposit to cover Express Charges.

We make a reasonable charge to cover the expense of boxing and carting.

All the Telegraph Instruments named in this Catalogue are **Nickel-Plated.**

1120691

# THE "PRIVATE LINE" IS THE BEST.

---

Pay a Reasonable Price and get Your Money's Worth.

---

It is the unanimous verdict of all who have used this Instrument that it is "the best."

There is nothing cheap or shoddy about the make of the "Private Line." Only good material is used in its construction. It is thoroughly well made, and is intended for actual service.

The brass parts of this instrument are **nickel-plated**.

**Get a good thing while you are about it.**

An evidence of the satisfaction given by this Instrument is afforded by the numerous applications which we receive from parties who, having purchased cheaper instruments before seeing ours, desire to exchange them for the "*Private Line*."

We are as unwilling to sell as we are to manufacture a grade of telegraphic instruments so cheap as to be unsuited for service; hence we are obliged to decline taking any other instrument in exchange for ours. If we wished to sell such instruments we would make them.

This Instrument is sold only for cash in advance, but the full amount of money paid, less cost of transportation, will be refunded to any one desiring to return the Private Line Instrument after having examined it.

It is only by manufacturing in large quantities, and selling strictly **for Cash**, that we are enabled to offer so fine a piece of work at so low a price.

This Manual of Telegraphy will be sent free to any address.

WESTERN ELECTRIC CO.

# CONDENSED MANUAL,

PREPARED BY

GEORGE H. BLISS.

## Morse Alphabet.

A	B	C	D	E	F	G
---	----	----	----	----	----	----
H	I	J	K	L	M	N
----	----	----	----	----	----	----
O	P	Q	R	S	T	U
----	----	----	----	----	----	----
V	W	X	Y	Z	&	
----	----	----	----	----	----	----

## NUMERALS.

1	2	3	4	5
----	----	----	----	----
6	7	8	9	0
----	----	----	----	----

## PUNCTUATION MARKS.

Period.	Comma.	Semi-colon.	Quotation.
----	----	----	----
Parenthesis.	Interrogation.	Italics.	Paragraph.
----	----	----	----
Exclamation.			
----			

There are forty-six characters, composed of three elements—the dot, dash and space.

The first step is to memorize the alphabet, so that each character can be called to mind at will; thus, A, dot and dash; B, dash and three dots; C, two dots, space, dot, &c. The period is the only punctuation mark in frequent use, and the student need not learn the others, at first,

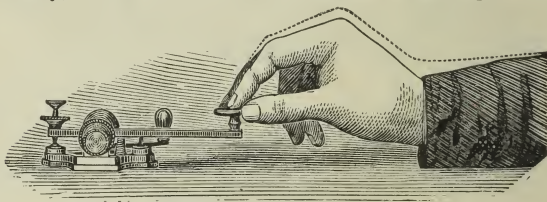
A dot (E) is made by a single, instantaneous, downward stroke of the key. A short dash (T) is made by holding the key down as long as it takes to make three dots. A long dash (L or cipher) is made by holding down the key as long as is required to make six dots. A cipher is frequently prolonged so as to occupy the time required for nine dots.

The intervals between dots or dashes in the same letter are called breaks. A space in letters should occupy the time required for a dot and break. The space between letters should occupy the time required for two dots and breaks.

The space between words should occupy the time required for three dots and breaks.

In letters that do not contain spaces, the dots and dashes should follow each other as closely as possible.

The beginner should be careful to form and space his letters correctly, as this will lead to a perfect style in sending.



### POSITION AND MOVEMENT.

Place the first finger on the top of key button, with the thumb under the edge; and the second finger on the opposite side. Curve the first and second fingers, so as to form the quarter section of a circle. Partially close the third and fourth fingers. Allow the wrist to be perfectly limber. Rest the arm on the table at or near the elbow.



Let the grasp upon the key be firm, but not rigid. Never allow the fingers or thumb to leave the key, nor the elbow to leave the table. Avoid too much force, or too light touch, and strive for a medium firm closing of the key.

The motion to be imparted is directly up and down, avoiding all side pressure.

The movement is made principally at the wrist, although the finger and hand must be perfectly elastic.

The fingers wrist and arm, should move uniformly in the same direction.

The downward movement produces the dots and dashes, and the upward, the breaks and spaces.

Commence the use of the key by making dots in succession at the rate of two every second, and increase the speed five fold as skill is acquired. Continue to practice dots until 360 per minute can be made with perfect clearness and regularity.

When dots can be readily made as directed, begin with dashes at the rate of two in every three seconds, and gradually increase until 120 per minute can be made with perfect regularity.

Next, attempt the long dash at the rate of one every two, seconds, and increase to sixty per minute.

When perfection is attained, take up the following exercises in order. Remember that in letters of more than one character, unless spaced, the dots and dashes must follow each other closely.

Repeat each exercise forward and backward, and by selection, until every letter can be made at will correctly.

#### EXERCISE No. 1.—Dot Letters.

E	I	S	II	P	6
-	- -	- - -	- - - -	- - - - -	- - - - -

#### EXERCISE No. 2.—Dot and Space Letters.

Take pains to make the spaces uniform, and in the proper place.

O	C	R	Y	Z	&
-	- -	- - -	- - - -	- - - - -	- - - - -

EXERCISE No. 3.—Dash Letters.

Be careful to proportion short and long dashes accurately.

T	L	M	5	0
—	—	—	—	—

EXERCISE No. 4.—Dots, with Dash, in succession

Avoid leaving any space between them.

A	U	V	4
—	—	—	—

EXERCISE No. 5.—Dash with Dots in succession.

N	D	B	8
—	—	—	—

EXERCISE No. 6.—Dots or Dashes in mixed Combination.

F	G	J	K	Q	W
—	—	—	—	—	—
X	1	2	3	7	
—	—	—	—	—	—
9	Period.				
—	—	—	—	—	—

EXERCISE No. 7.—Alphabet and Numerals mixed.

Drill upon this exercise until perfection is attained, and when possible, use a register to see that the dots are not prolonged, the spaces are uniform, the dashes correct length, the dots and dashes (when not spaced) are close together, and the letters equal distances apart. Do not leave this exercise till completely mastered.

A	N	B	V	C	R
—	—	—	—	—	—
D	U	E	T	F	1
—	—	—	—	—	—
G	W	H	5	1	M
—	—	—	—	—	—
J	3	K	9	L	
—	—	—	—	—	—

Period.	O	2	P	4
Q	X	S	6	Y
Z	&	7	8	0

There are almost as many styles of sending among operators as of penmanship. It is quite possible on a line where forty operators work, to tell each one by his manner of manipulating the key. Cultivate a firm, even, smooth style of sending. The fast writers do not dispatch the most business. Graduate your writing to the capacity of the receiver, and never crowd him.

#### EXERCISE No. 8.—Fractions.

Fractions are made by substituting a dot for a hyphen between the figures.

1-2	1-4
2-3	3-5
7-8	9-10
11-12	

#### EXERCISE No. 9.—Numbers.

In large numbers, a short space is usually made between every three figures.

1,000.	
1,500.	
18,907.	
21,369.	
4,586,329.	

#### EXERCISE No. 10.—Unusual Spaces.

In words largely composed of dots and spaced letters, the spaces should be larger than usual between the letters.

Seen.

Erie.

Receive.

Cicero.

EXERCISE No. 11.—Words.

After the student can write the words in this Exercise satisfactorily, he may arrange several series himself for practice.

And.

Barn.

Chair.

Desire.

Exchange.

Family.

German.

Humane.

Inmate.

Judgment.

Knowledge.

Limited.

Maintain.

Nominate.

Opinion.

Practice.

Quotation.

Ramify.

Standard.

Terminate.

Umbrage.

Vacant.

Warrant.

Xenium.

Yorkville.

Zoology.

EXERCISE No. 12.—Sentences.

The student may take such sentences as he chooses for practice, always being careful to write one correctly before commencing with another.

EXERCISE No. 13.—Office Calls.

Every telegraph office has a name or call, which usually consists of one or two letters; thus the call for New York is N. Y.; Chicago, Ch.; San Francisco, S. F. If New York desires to communicate with San Francisco, he repeats the latter call on the line till answered. It is proper to sign one's own office every three or five calls so that others may know who is using the wire. Thus:

If San Francisco hears the call, he opens his key, and answers by repeating "I" several times, and signing his own call thus:

When so answered, New York proceeds with his business. The process is exactly the same between any other two offices.

EXERCISE No. 14.—Abbreviations.

A few of the more common abbreviations are given, not in alphabetical arrangements, but those most used are given first.

They should be committed to memory and practiced with the key until perfectly acquired. Abbreviations are usually made by dropping out the vowel sounds, and leaving the consonant skeleton. Some are, however, entirely arbitrary.

From, Fm.; Signature, Sig.; Check, Ck.; Go ahead, G. A.; Paid, Pd.; Collect, Col.; Free or Dead-head, Dh.; Answer, Ans.; Another, Ahr.; Where shall I go ahead?  
4 ; Wait a minute, 1; Correct, or all right,  
O. K. ; Quick, Q. K.; Repeat, R. R.;  
Street, St.; Avenue, Ave.; Through, Thru.; Address, Ads.;  
Guaranteed, Gtd.; Business, Bsns.; Charges, Chgs.; Mes-  
sage, Msg.; Messenger, Msgr.; Operator, Opr.; Office, Of.;  
Tariff, Tff.; Telegraph, Tel.; Amount, Amt.; Break, Brk.;  
Express, Ex.; Freight, Frt.; Passenger, Pass.; Battery, Bat.;

Instrument, Inst.; Ground Wire, G. W.; Barrel, Bbl.; Important, Impt.; Immediately, Immy.; Arrive, Ar.; Leave, Lv.; Depart, D.; Minutes, Min.; Mistake, Msk.; Morning, A. M.; Afternoon, P. M.; Night, Nite.; Post Office, P. O.; Please, Pls.; Stocks, Stx.; Train, Trn.; Superintendent, Supt.; General, Gen.; Manager, Man.; President, Prest.; Conductor, Cond.; Engineer, Engr.; Way Bill, W. B.; Collect on delivery, C. O. D.; Circuit, Ckt.; Good Morning, G. M.; Good Night, G. N.; Number, No.; Stop for breakfast, S. F. B.; Stop for dinner, S. F. D.; Stop for tea, S. F. T.; Stop for night, S. F. N.; The end or finis,—30.

Many other Abbreviations will be readily acquired in actual business.

### MESSAGES.

Commercial messages may be divided into five parts, viz: date, address, body, signature, and check. The date is composed of the name of the place where the message originates, the month, day of the month, and year. An operator accepting a commercial message for transmission, should be careful that this is written out in full as follows:

New York, Dec. 10th, 1873.

In actual transmission, the month and year are always omitted. Between offices on the same circuit, the office call is frequently used, and the date omitted. It can do no harm to write the name in full, and the date should always be given in commercial business. This is always done when the message goes beyond the line where it originates. In sending a message, the date is always prefixed by "from" abbreviated to Fm. or Fr.

### EXERCISE No. 15.

From New York, Dec. 10th, 1873.

-----  
-----  
Or sometimes on same line.  
-----

The address should comprise the full name and place of the person to whom the message is addressed. When not known, the number and street should be given, as well as the place of destination and State. The word "to" always precedes

the address, and a period divides it from the body of the message. When the office to which a message goes, is on the same line, only the office call is written. When the message goes through, the destination is spelled out in full.

EXERCISE No. 16.

From New York, Dec. 10, 1873.

To John Wilson,  
22 State St., Chicago, Ill.  
(Through Message.)

-----  
-----  
-----  
-----  
-----  
-----

Local Message.

-----  
-----  
-----

The body of the message is embraced between the period and signature. No abbreviations are permitted, or if inserted, each letter is charged for; compound words are usually considered one word. Numbers are written out in full, and if the figures also are inserted, are paid extra for. The body of some messages are written in cypher, being composed of disjointed words, having no sense unless interpreted by means of the key in possession of the sender and receiver.

EXERCISE No. 17.

From New York, Dec. 10, 1873,

To John Wilson,  
22 State St., Chicago, Ill.

Goods were shipped on the fifth by American Express.

Sig., Henry Harding.

-----  
-----  
-----



The check follows the signature of a message, and gives the number of words in it subject to tariff. It aids in preventing omissions and errors. The check also tells whether a message is paid, collect, or free,—if free, it usually explains why.

### EXERCISE No. 18.

For a paid message of nine words, the check should read;  
9—Pd. ——— ——— ———

For a collect message: 9—Col. ——— ——— ———

For a free message on account of pass—9, pass, No. 101  
———— ——— ——— ———

For a free message, account of operator—9, Dh., operator :  
———— ——— ——— ———

The former custom of transmitting the amount of tariff on a message, has been abandoned by most companies, except in cases where a message comes collect, from a foreign line, to be forwarded. Thus on a message from St. Paul to New York, to be transferred at Chicago, the tariff for each being \$1.00, the check put on the message by Chicago would read: 9—Col. \$1.00, and \$1.00: ——— ——— ———

By the new system, both the sending and receiving operators calculate the checks, and enter it on their message and books.

Where companies transmit checks, they are made to read as follows:

A paid message of nine words, the tariff being one dollar, would read: 9 words, \$1.00, paid:

-----  
If collect, it would read: 9 words, \$1.00, Col.:

-----  
When a paid message is to pass over two companies' lines; for instance, from New York to St. Paul, Chicago being the point of transfer, and the tariff for each company, one dollar, the check would read: 9 words, \$1.00, and \$1.00, paid:

-----  
When the message passed Chicago, he would drop one dollar, and check would read:

9 words, 100, Pd.

-----  
New York would start a collect message for St. Paul:  
9 words, collect \$1.00.

-----  
When the message passed Chicago, he would make check read; 9 words, collect 100 and 100.

-----  
Upon full paid business, ten words can be sent as cheaply as one, but for all over ten, an additional rate (per word) is charged. The date and address of a message are not counted. The body of the message is always counted. The extra signatures, titles and directions after signatures, are counted. When there are several signatures, the last one goes free. Upon half-rate messages, the same rule applies, except that the tariff is computed at one-half of full rates.

The "From," "To" and "Sig." in a message, are never copied by the receiver.

When two or more copies of the same messages are delivered to different persons, each one must be paid for.

Transient customers are usually required to pay in advance for both the message and answer.

To calculate the tariff to a point on another Co's line, find

the rate to the transfer office, and add to it the rate between point of transfer and point of destination, for the full tariff; always check the transfer office.

When an office is through receiving a message, he must always say O. K. and sign his office, thus :

- - - - - or - - - - -

If no O. K. is received, it will be known that the message has not been properly received, and must be repeated.

When the sender discovers that he has made a letter wrong, he stops, makes more than six dots, says "msk." (mistake) and commences again with the last word made correctly.

When the receiver finds he is not getting a message correctly, he breaks and tells sender to "G. A." (go ahead) the last word received.

After receiving a message, the operator should be careful to see that he has the right number of words, as called for by the check of messages. If they do not agree, he should compare with sender till error is found. This is usually done by commencing at period, and writing the first letter in each word till the missing portion is discovered,

There are a variety of forms for train orders, sent and received, office messages, press reports, etc.—forms for which can usually be obtained from the nearest telegraph office.

A few examples are given, not to cover the whole ground, (for forms vary greatly on different lines,) but to give the student a general idea which will assist him in the future.

Messages between employes and upon company business, are sent without checks and with much less formality than commercial messages.

Office messages are used to assist in the prompt transaction of business and correction of errors.

If the address of the message from New York to John Wilson, Chicago, should be received in such shape that the party could not be found, Chicago would send the following :

To New York office :

Give better address Wilson, signed Harding, of tenth.  
Chicago Office.

- - - - -

To this message, New York might reply :

To Chicago Office :

Cannot give better address, Wilson signed Harding, of  
tenth, New York Office.

If New York had given a wrong address in first instance,  
he might reply :

To Chicago Office :

Find Wilson at thirty-two State instead of twenty-two,  
message of tenth, signed Harding. New York Office.

Railroad business is transacted with much less formality than is used in commercial messages. The names in addresses and signatures, are sometimes abbreviated to the initials simply. Dates are often omitted, and no checks are sent ; also, many words in the body of message, are abbreviated. When, however, the business of a railroad company, passes off from its own line, it is treated the same as other free or paid business. Each operator, if possible, should get from some operator near him, copies of the form for train orders, and other business used on the railroad in his vicinity, and make them a study.

Paper operators are now rare, and the student should learn to read by sound at once. It is as easy to cultivate the ear as the eye ; reading by sound leaves the sight free to direct the hand in copying messages.

Each lesson should be mastered before another is undertaken. Nothing is gained by rushing hurriedly over the ground. No business can be learned in a day ; and telegraphy requires careful methodical drill and study. It is better for two or more persons to practice together, taking turns in writing.

It should be remembered, that there is no change in the tone of a sounder ; the letter being determined solely by the "time or times" the lever is up or down. The back stroke, so called, is as necessary to reading by sound, as the down

stroke, and these must be distinguished each from the other; for without it, the duration of the downward movement could not be determined.

There are a few operators capable of sending and receiving forty-five words per minute. Forty words is very rapid work. The average speed does not reach thirty words. When the student finds himself capable of sending and receiving promiscuous messages at the rate of thirty-five words, he may begin to look about for an office. The local peculiarities of doing business upon different lines, are very great. When practicable, the graduate should spend three or four weeks in an office, familiarizing himself with the rules, forms, and methods of the line before attempting the management himself. Most operators commence their career upon railroad lines, and more fail in the first attempt from not comprehending the responsibilities and duties, than from incapacity to telegraph. A few hints may not be out of place. The young operator should ascertain what his office hours are, and never be absent in them. If called upon for extra service, be careful not to leave till dismissed by the officer in charge. Never allow a message to remain undelivered in the office, or a message to hang unsent on the hooks. Don't be afraid or ashamed to "break," or ask for information—Better fifty breaks or questions, than one error.

Handle all business accurately, but especially train messages, which involve life and property. Never deliver a train order till it has been repeated to the train dispatcher, and he has sent the "all right," in reply.

Never assume the responsibility of another without instructions to do so.

Be pleasant and polite to all with whom you have business, on the line and in the office.

It is easy to learn and to keep the reputation of being prompt and efficient.

The first situation is sometimes difficult to secure, but once employed, a good operator is seldom out of work.

Keep your office, books and papers neat and in order. Enter your business daily, and make all reports to the railroad and telegraph company when required.

Telegraphing is the road to many excellent situations in Railroad, Express and business circles.

## EXPLANATIONS AND DIRECTIONS.

In the Alphabet, let a dot represent a short but firm closure of the key, and a short stroke of the receiving instrument. Let a dash represent a prolonged closure of the key, and a long stroke of the receiving instrument. Further, let a space represent a pause or rest between two closures of the key.

It will be seen that the dots, dashes, and spaces of the Alphabet represent both the movement of the key and of the receiving instrument. Now, taking A for example, it is represented as formed of a dot and a dash, which, of course, represents a short stroke and a long stroke.

When making two or three dots or dashes in succession, put them compactly together, so that intervals may not be mistaken for spaces.

Go slowly at first. The receiver should copy each letter as it is signalled. The sender should make good spaces in letters, and long spaces between words. Finally, let there be an unmistakable difference between dots and dashes.

## PRIVATE LINES.

In the construction of short lines, No. 12 galvanized wire is chiefly used. This wire weighs one hundred and seventy pounds, and measures thirty ohms resistance to the mile. For lines not more than two or three miles in length No. 14 wire will answer perfectly well. The weight is about one hundred pounds to the mile, and the resistance fifty-three ohms. Telegraph wire comes in half-mile coils.

Only one wire is necessary to the construction of a line, the earth being used for the return current.

Great care should be taken to have the earth connections perfect. When possible, connect the ends of the line to gas or water pipes, but when this cannot be done bury metal plates having at least ten square feet so deep that the earth on their surface is perpetually moist.

In locations where the earth is very dry it is sometimes impossible to make good ground connection, and in such cases we recommend a metallic circuit, as being more economical than the large battery which would be required to overcome the excessive resistance.

The resistance in the instruments on a line should be proportioned to its length. The rule is to make the re-



sistance in the instruments equal to that of the line and battery. Instruments for use on a short circuit are made with five ohms, but for long lines should be proportioned to their length.

In ordering instruments give the length of line and the number of instruments to be used on it.

It is safe to calculate one cup of battery for every five units of resistance for short lines.

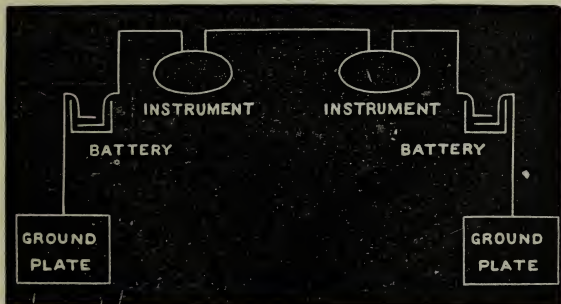
### TO CONNECT A SINGLE PRIVATE LINE.

Run a wire from one binding post of the instrument to the zinc pole of the battery, and another from the other binding post on instrument to the copper of battery. If more than one cup is used, the copper of one cell is connected to the zinc of the next.

### TO CONNECT TWO INSTRUMENTS.

Run a wire from one binding post of instrument No. 1 to the opposite post on No. 2; then run a wire from the remaining binding post on each instrument to the respective poles of the battery.

### SHORT LINE DIAGRAM.



## TO CONNECT TWO INSTRUMENTS WITH A SHORT LINE.

Run a wire from the zinc pole to a gas or water pipe, and carefully connect it; then run a wire from the copper pole to a binding post on the instrument; connect the line wire to the opposite binding post; at the other end of the line, attach the wire to one binding post, then run a wire to the gas or water pipe from the opposite post. If part of the battery is used at each end of the line, always be careful to have the zinc and copper poles of the battery towards each other.

### THE COST OF SHORT LINES.

The following estimates may be useful in reckoning the cost of building and equipping private telegraph lines:

#### I. Line 200 yards long, with two instruments.

2 Private Line outfits, at \$8 25, less 20 per cent...	\$13 20
200 yards No. 12 galv'iz'd tele'ph wire, 20 lbs. at 9c..	1 80
3 Pony Insulators, with brackets, at 7c.....	21
2 window tubes and connectors.....	50
	<hr/>
	\$15 71

#### II. Line half-mile long, with three instruments.

3 Private Line instruments, at \$7.00, less 20 per cent.	\$16 80
6 Cells 6x8 gravity battery, at \$1.10, less 10 per cent..	5 94
3 Private Line cut-outs, at \$1.50, less 20 per cent..	3 60
2 lbs. office wire, at 50c., less 10 per cent.....	90
10 lbs. blue vitriol, at 12c., less 10 per cent.....	1 08
2 lbs. sulphate zinc, at 12c., less 10 per cent.....	22
4 window tubes and connectors .....	1 00
$\frac{1}{2}$ mile No. 12 wire, B. B. L., 82 lbs. at 9c .....	7 38
15 Pony Insulators and brackets, at 7c .....	1 05
	<hr/>
	\$37 97

No. 14 wire could be used instead of No. 12, reducing the cost of the outfit to \$35.89.

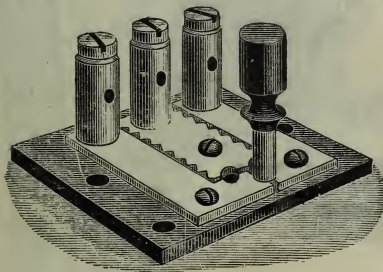


### III. Line three miles long, with ten instruments.

10 Private Line instruments, at \$7.00, less 20 per ct.	\$56 00
10 Private Line cut-outs, at \$1.50, less 20 per cent...	12 00
18 window tubes and connectors.....	4 50
5 lbs. office wire at 50c., less 10 per cent.....	2 25
$\frac{1}{2}$ lb. double-pointed tacks.....	30
20 cells 6x8 gravity battery, at \$1.10, less 10 per cent.	19 80
1 50-lb. keg blue vitriol.....	5 00
5 lbs. sulphate of zinc.....	54
3 miles, 490 lbs., No. 12 wire, B. B. L., at 9c.....	44 10
90 Pony Insulators and brackets, at 7c.....	6 30
	<hr/>
	\$150 79

No. 14 wire might be used for this line, reducing the cost of the outfit to \$137.29.

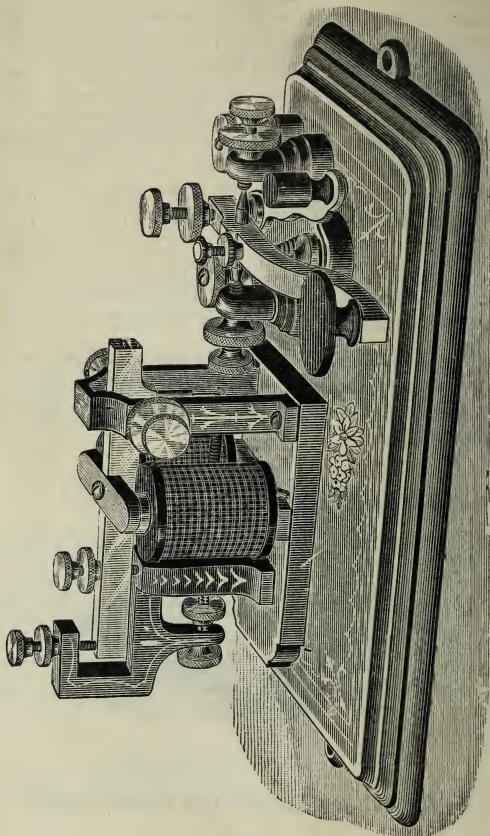
The items in the above estimates will, of course, be modified to suit each case. Instead of window tubes and connectors, a piece of ordinary office wire may be used, with a table binding post.



**PRIVATE LINE CUT-OUT.**

**With Lightning Arrester and Ground Switch.**

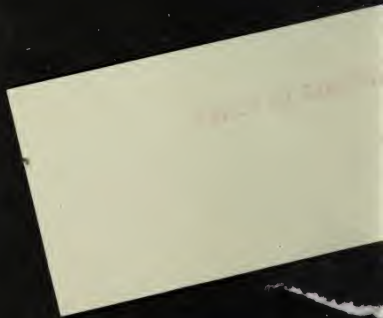
“PRIVATE LINE” INSTRUMENT.



**NOTE REDUCTION IN PRICE.**

Price of Instrument only.....	\$4.00 net.
“ Complete Outfit, packed.....	5.00 net.

10-15-83.



## PRIVATE LINE INSTRUMENT.

This Instrument is substantially made, and is mounted on a japanned iron base, finely finished. It has a full-sized friction circuit-closer key, with curved lever, and a regular two-spool giant sounder, which gives a loud, clear sound. It may be adapted to work on a line from a few feet to ten miles in length. In ordering, however, be careful to state the length of the line and the number of instruments used, as the resistance of the magnets must vary accordingly. If instruments are ordered for lines already in operation, state the average resistance of the instruments in use.

The Complete Outfit consists of an Instrument, one Cell of Standard Gravity Battery, the necessary Chemicals, a Manual of Telegraphy, and a Small Coil of Insulated Wire for Connections, comprising everything that is required by a student.

Several thousands of these Instruments are in use, giving perfect satisfaction.

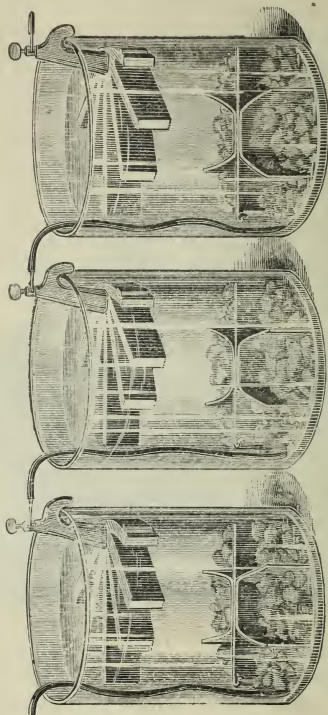
The brass parts of the Instrument are nickel-plated.

Instrument only.....	\$7 00
Complete Outfit.....	8 25
Packing.....	25

With the Order a discount of twenty per cent. allowed on the Instrument or Outfit.

## STANDARD GRAVITY BATTERY.

Crowfoot.



Diameter of jar, 6 inches; height, 8 inches; weight of zinc,  
3 pounds.

Price per cell.....\$1.00

## Directions for Setting Up and Using.

Unfold the copper strip so as to form a cross, and place it in the bottom of the jar.

Suspend the zinc about four inches above the copper, from the tripod or cross-piece. The connector for this purpose has a hole to receive the wire from the copper of the next cup.

Connect one of the line wires to the copper at one end of the battery. At the other end of the battery the connector which holds the zinc receives the other line wire.

Pour clean water into the jar so as to cover the zinc. Then, finally, drop in the blue vitrol in small lumps, not over six or eight ounces per cup at one time.

The battery, when first set up as above, is ready for use as a main battery.

A local battery should stand two or three days on a closed circuit before using, as the resistance in the battery itself makes the current weak. But the resistance may be reduced and the battery be made immediately available by drawing about half a pint of solution of sulphate of zinc from a battery already in use and pouring it into the jar; or, when this cannot be done, by pouring into the liquid four or five ounces of pulverized sulphate of zinc.

Blue vitrol should be dropped into the jar as it is consumed, care being taken that it goes to the bottom. The need of blue vitrol is shown by the fading of the blue color, which should be kept as high as the top of the copper, but should never reach the zinc.

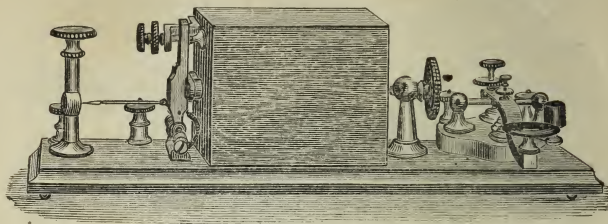
After the battery has been started no further attention is required, except to keep it supplied with blue vitrol, until the quantity of sulphate of zinc in solution has become too great. In that case draw out a portion of the top of the liquid with a syringe or cup and replace it with clear water.

As long as the battery continues in action there is an increase of the quantity of sulphate of zinc in solution in the upper part of the jar.

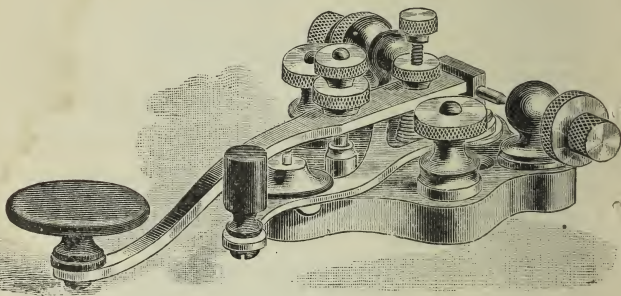
A hydrometer is convenient for the purpose of testing the strength of this solution.

When the specific gravity is less than 15 degrees, there is too little sulphate of zinc; when it is 30 degrees or over, there is too much in solution, and it must be diluted. When the zinc becomes coated so as to interfere with the action of the battery, they must be taken out and scraped clean and washed.





**No. 3 Box Relay, with Legless Key on Base.**  
**Price, \$15.50.**



**Lewis Legless Key. Price, \$4.50.**

Private Line Cut-Out, with Lightning Arrester and Ground Switch .....	\$1 50
Window Tube and Connector .....	25
Office Wire, No. 14, per pound.....	50
(About 60 feet to the pound.)	
Annunciator Wire, No. 18, per pound.....	50
(About 150 feet to the pound.)	

See Condensed Price List for full price list of Instruments, Battery, Insulated Wire, Office Supplies, Line Supplies, Electric Bells, Books on Electricity, &c., &c.



## PRICE LIST.

### LINE MATERIAL.

**On Line Material a Discount of FIVE PER CENT. will be made for CASH WITH ORDER.**

Insulator Screw Glass, No. 3 Egg .....	8c.
“ “ “ No. 4 “ Pony .....	4c.
Bracket Screw, best white oak, painted.....	3c.
Pin “ “ “ “ “ .....	3c.
Wire, No. 12, Galvanized E. B. B., per lb.....	10c.
“ “ “ B. B. L., “ .....	9c.
“ No. 14, “ E. B. B., “ .....	11c.
“ “ “ B. B. L., “ .....	10c.

No. 12 Wire averages 164 lbs. to the mile.

No. 14 Wire averages 97 lbs. to the mile.

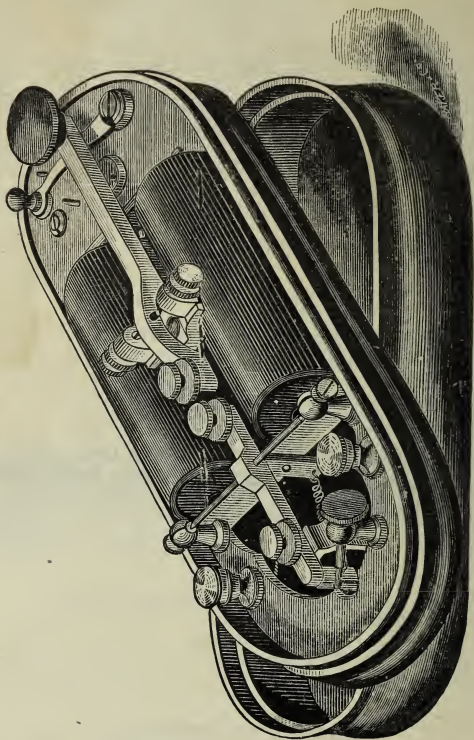
### BATTERY.

**On Batteries and Battery Supplies a Discount of TEN PER CENT. will be made for CASH WITH THE ORDER.**

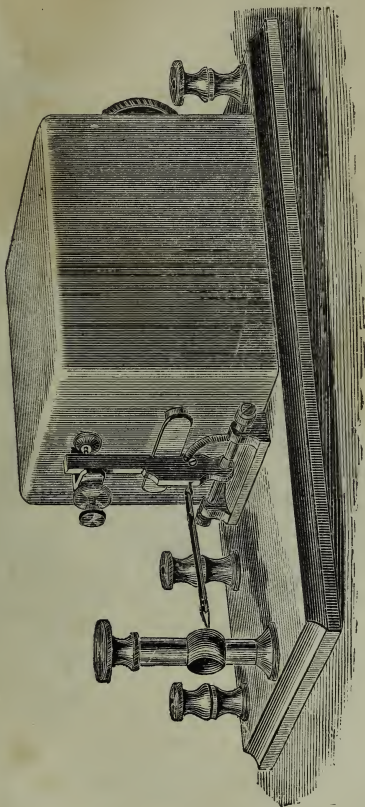
Standard Gravity, 6x8 Crowfoot, per Cell.....	\$1 00
Zinc.....	45
Copper.....	20
Tripod.....	15
Jar, Glass.....	35
Double Connectors, each.....	15
“ “ Round, each .....	10
Packing, one or two Cells.....	25
Packing, three to ten Cells .....	50

### BATTERY SUPPLIES.

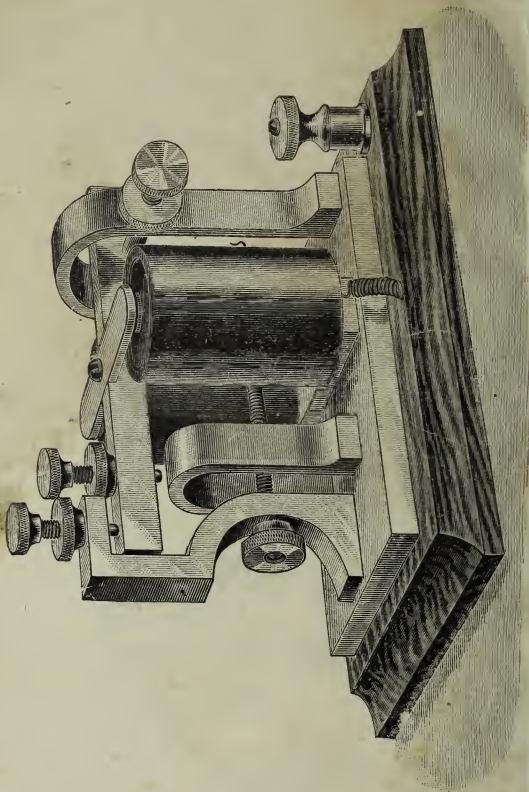
Blue Vitriol.....	per lb. \$ 10
Hydrometer.....	50
Syringe.....	2 00
Sulphate of Zinc.....	per lb. 10



Patent Pocket Relay. Price, \$16.00.



No. 1 Box Relay. Price, \$14.00.



No. 1 Sounder. Price, \$6.00.



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